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# Dividends From Wood Research

Recent Publications  
July–December 1998

## Explanation and Instructions

"Dividends From Wood Research" is a semiannual listing of recent publications resulting from wood utilization research at the Forest Products Laboratory (FPL). These publications are produced to encourage and facilitate application of Forest Service research. This issue lists publications received between July 1 and December 31, 1998.

Each publication listed in this brochure is available through at least one of the following sources.

**Available from FPL (indicated by an order number before the title of the publication):** Quantities limited. Circle the order number on the blank at the end of the brochure and mail or fax the blank to FPL.

**Available through the Internet:** Listed publications are available as PDF documents for viewing or printing from FPL's web site (<http://www.fpl.fs.fed.us/>).

**Available through sales outlets:** Major sales outlets are the Superintendent of Documents, the National Technical Information Service (NTIS), and various private publishers. Order directly from the outlet.

**Available through libraries:** Research publications are available through many public and university libraries in the United States and elsewhere. U.S. Government publications are also available through many Government Depository Libraries. Check with a major library near you to determine availability.

## List of Categories

Publications are listed in this brochure within the following general categories:

- Biodiversity and Biosystematics of Fungi
- Decay Processes and Bioprocessing
- Durability
- General
- Papermaking and Paper Recycling
- Properties and Use of Wood, Composites, and Fiber Products
- Surface Chemistry
- Timber and Fiber Demand and Technology Assessment
- Wood Chemistry

## Biodiversity and Biosystematics of Fungi

### Identification of Groups Within *Laetiporus sulphureus* in the United States Based on RFLP Analysis of the Nuclear Ribosomal DNA

Banik, Mark T.; Burdsall, Harold H., Jr.; Volk, Thomas J.  
1998. *Folia Cryptog. Estonica*. Fasc. 33: 9–14.

## Decay Processes and Bioprocessing

### Expression of *Phanerochaete chrysosporium* Genes Encoding Lignin Peroxidases, Manganese Peroxidases, and Glyoxal Oxidase in Wood

Janse, Bernard, J.H.; Gaskell, Jill; Akhtar, Masood;  
Cullen, Daniel  
1998. *Appl. Environ. Microbiol.* 64(9): 3536–3538.

### Genetic Engineering of *Pichia stipitis* for the Improved Fermentation of Xylose

Jeffries, T.W.; Shi, N.Q.; Cho, J.Y.; Lu, P.; Dahn, K.;  
Hendrick, J.; Sreenath, H.K.; Davis B.P.  
1998. In: *Proceedings, Bioenergy'98: expanding bioenergy partnerships*; 1998 October 4–8; Madison, WI. Madison, WI: Great Lakes Regional Biomass Energy Program: 843–851.

### Rapid Polyether Cleavage via Extracellular One-Electron Oxidation by a Brown-Rot Basidiomycete

Kerem, Zohar; Bao Wuli; Hammel, Kenneth E.  
1998. In: *Proceedings, National Academy Science USA* 95: 10373–10377.

## Durability

### Fire Performance Issues

Cramer, Steven M.; White, Robert H.  
1998. In: *Fridley, Kenneth J., ed. Wood engineering in the 21st century: research needs and goals. Proceedings, workshop offered in conjunction with the SEI/ASCE Structures Congress XV*; 1997 April 16; Portland, OR. Reston, VA: Struc. Eng. Institute/Am. Soc. Civil Eng.: 75–87.

### Non-Destructive Assessment of Wood Decay and Termite Attack in Southern Pine Sapwood

De Groot, R.C.; Ross, R.J.; Nelson, W.J.  
1998. *Wood Protection*. 3(2): 25–34.



### **Preservative Treatment Evaluation of Five Appalachian Hardwoods at Two Moisture Contents**

Hassler, Curt C.; Slahor, Jeffrey J.; De Groot, Rodney C.; Gardner, Douglas J.  
1998. *Forest Prod. J.* 48 (7/8): 37–42.

### **Alternative Wood Preservatives for Use in Indonesia**

Permadi, Pipin; De Groot, Rodney C.; Woodward, Bessie  
1998. *Forest Prod. J.* 48(11/12): 98–101.

### **Effect of Incising and Preservative Treatment of Shear Strength of Nominal 2-inch Lumber**

Morrell, Jeffrey J.; Gupta, Rakesh; Winandy, Jerrold E.; Riyanto, Djoko S.  
1998. *Wood Fiber Sci.* 30(4): 374–381.

### **Cleaners & Restorers for Wood Decks**

Ross, Alan; Daisey, George; Jourdain, Charles; Williams, Sam  
1998. *The Paint Dealer.* 7(4): 30–33.

### **Scanning Technique to Identify Biologically Degraded Wood**

Ross, R.J.; De Groot, R.C.  
1998. *Experim. Tech.* 22(3): 32–33.

### **Assessing Wood Members in the USS Constitution Using Non-Destructive Evaluation Methods**

Ross, Robert J.; Soltis, Lawrence A.; Otton, Patrick  
1998. *APT Bull.—J. Preserv. Tech.* 29(2): 21–25.

### **► 1. Equilibrium Moisture Content of Wood in Outdoor Locations in the United States and Worldwide**

Simpson, William T.  
1998. *USDA Forest Serv. Res. Note FPL–RN–0268.* 11 p.

The purpose of this note is to provide a list of locations, both within and outside the United States, with the mean monthly equilibrium moisture content (EMC) values of wood exposed to the outdoor atmosphere but protected from direct precipitation or sun. A secondary purpose is to provide easy to use information on the decrease in relative humidity, thus EMC, that results from increasing the temperature of an enclosed storage space above the temperature of the outdoor ambient temperature.

### **Relationship Between Speed of Sound and Moisture Content of Red Oak and Hard Maple During Drying**

Simpson, William T.  
1998. *Wood Fiber Sci.* 30(4): 405–413.

## **General**

### **Wood**

Durbak, Irene; Green, David W.; Highley, Terry L.; Howard, James L.; McKeever, David B.; Miller, Regis B.; Pettersen, Roger C.; Rowell, Roger M.; Simpson, William T.; Skog, Kenneth E.; White, Robert H.; Winandy, Jerrold E.; Zerbe, John I.  
1998. In: *Kirk-Othmer Encyclopedia of Chemical Technology*, 4th ed, vol. 25. New York, NY: John Wiley & Sons, Inc.: 627–664.

### **Focusing on Environmental Sensitivity in Wood Products Research**

Hamilton, Thomas E.; Winandy, Jerrold E.  
1998. In: Edited by Chinese Academy of Forestry. *Forestry towards the 21<sup>st</sup> Century*. Proceedings, 40<sup>th</sup> anniversary of Chinese Academy of Forestry. China Agricultural Sciencetech Press.

### **Biomass Utilization for Forest Health and Community Development**

LeVan, Susan L.  
1998. In: *Proceedings, Bioenergy'98: expanding bioenergy partnerships*; 1998 October 4–8; Madison, WI. Madison, WI: Great Lakes Regional Biomass Energy Program: 1140–1150.

### **Life Cycle Assessment: Measuring Environmental Impact**

LeVan, Susan L.  
1998. In: *Life cycle environmental impact analysis for forest products*. Proceedings, 49<sup>th</sup> annual meeting, Forest Products Society; 1995 June; Portland, OR. Madison, WI: Forest Products Society.

## **Papermaking and Paper Recycling**

### **Environmentally Friendly Technologies for the Pulp and Paper Industry**

Young, Raymond A.; Akhtar, Masood, eds.  
1998. New York, NY: John Wiley & Sons, Inc.

### **Steam Explosion Pulping**

Kokta, Bohuslav; Ahmed, Aziz  
1998. 6: 191–214.

### **Taxonomy of Industrially Important White-Rot Fungi**

Burdsall, Harold H. Jr.  
1998. 8: 259–272.

### **Enzymology and Molecular Genetics of Wood Degradation by White-Rot Fungi**

Kirk, T. Kent; Cullen, Dan  
1998. 9: 273–307.

### **An Overview of Biomechanical Pulping Research**

Akhtar, Masood; Blanchette, Robert A.; Myers, Gary; Kirk, T. Kent  
1998. 10: 309–340.

### **Engineering, Scale-Up, and Economic Aspects of Fungal Pretreatment of Wood Chips**

Scott, Gary M.; Akhtar, Masood; Lentz, Michael J.; Sweaney, Ross E.  
1998. 11: 341–383.

### **Fungal Treatment of Wood Chips for Chemical Pulping**

Messner, Kurt; Koller, Karin; Wall, Mary B.; Akhtar, Masood; Scott, Gary M.  
1998. 12: 385–419.

### **Biokraft Pulping of Kenaf and Its Bleachability**

Ahmed, Aziz; Scott, Gary M.; Akhtar, Masood; Myers, Gary C.  
1998. In: *North American nonwood fiber symposium*. Proceedings, 1998 Tappi proceedings; 1998 February 17–18; Atlanta, GA. Atlanta, GA: TAPPI PRESS: 231–238.

### **Overview of Biomechanical and Biochemical Pulping Research**

Akhtar, M.; Scott, G.M.; Swaney, R.E.; Kirk, T.K.  
1998. In: Eriksson, Karl-Erik L.; Cavaco-Paulo, Artur, eds. *Enzyme applications in fiber processing*. Proceedings, ACS symposium; 1997 April; San Francisco, CA. Washington, DC: American Chemical Society: 15–27.

### **An Evaluation of Quantification Methods for Plastics**

Davila, Antonio; Scott, Gary M.; Klungness, John H.  
1998. *Tappi J.* 81(7): 145–148.



## **Precipitating Calcium Carbonate Within the Stock Preparation Process**

Klungness, John H.  
1998. In: *World Pulp & Paper Technology* 1998/99.

## **New Technology for Papermaking: Commercializing Biopulping**

Scott, Gary M.  
1998. *Tappi J.* 51(11): 220–225.

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## **Properties and Use of Wood, Composites, and Fiber Products**

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### **► 2. Laboratory Research Program on Small-Diameter Material**

Forest Products Laboratory  
1998. USDA Forest Serv. Gen. Tech. Rep. FPL–GTR–110. 11 p.

This document summarizes past and present research studies as well as those that are currently being initiated on small-diameter use. These studies involve many different regions and rural communities. However, the information gained in any specific location can usually be applied nationally.

### **Flakeboard Thickness Swelling. Part 1—Stress Relaxation in a Flakeboard Mat**

Geimer, Robert L.; Kwon, Jin Heon; Bolton, James  
1998. *Wood Fiber Sci.* 30(4): 326–338.

### **Standards for Structural Wood Products and Their Use in the United States**

Green, David W.; Hernandez, Roland  
1998. *Wood Design Focus.* 9(3): 3–12.

### **Variations of Microfibril Angle in Loblolly Pine: Comparison of Iodine Crystallization and X-ray Diffraction Techniques**

Kretschmann, David E.; Alden, Harry A.; Verill, Steve  
1998. In: Butterfield, B.G., ed. *Microfibril angle in wood*. Proceedings, IAWA/IUFRO international workshop on the significance of microfibril angle to wood quality; 1997 November; Westport, New Zealand. Christchurch, New Zealand: University of Canterbury: 157–177.

### **Applications of Natural Fibers in Automotive Industry in Brazil—Thermoforming Process**

Leao, Alcides; Rowell, Roger; Tavares, Nilton  
1998. In: Prasad, P.N. and others, eds. *Science and technology of polymers and advanced materials—Emerging technologies and business opportunities*. New York, NY: Plenum Press: 755–761.

### **Benefits From Wood Engineering Research**

LeVan, Susan L.  
1998. In: Fridley, Kenneth J., ed. *Wood engineering in the 21st century: research needs and goals*. Proceedings of the workshop offered in conjunction with the SEI/ASCE Structures Congress XV; 1997 April 16; Portland, Oregon. Reston, VA: Struc. Eng. Institute/Am. Soc. Civil Eng.: 1–5.

## **Wood in Infrastructure: Analysis of Research Needs and Goals**

Moody, Russell C.; Ritter, Michael A.  
1998. In: Fridley, Kenneth J., ed. *Wood engineering in the 21st century: research needs and goals*. Proceedings of the workshop offered in conjunction with the SEI/ASCE Structures Congress XV; 1997 April 16; Portland, Oregon. Reston, VA: Struc. Eng. Institute/Am. Soc. Civil Eng.: 96–109.

### **Emerging Timber Bridge Technology in the United States**

Ritter, Michael A.  
1998. In: Srivastava, N.K.; Fennes, Gregory L.; Domer, Ronald G.; Ang, Alfredo H. –S. *Structural Engineering World Wide 1998*. Proceedings, Structural Engineers World Congress; 1998; San Francisco, CA.: Elsevier. p. 870.

### **Property Enhanced Natural Fiber Composite Materials Based on Chemical Modification**

Rowell, Roger M.  
1998. In: Prasad, P.N. and others, eds. *Science and technology of polymers and advanced materials—Emerging technologies and business opportunities*. New York, NY: Plenum Press: 717–732.

### **Recent Advances in Agro-Fiber/Thermoplastic Composites**

Rowell, Roger M.; Caulfield, Daniel F.; Chen, George; Ellis, W. Dale; Jacobson, Rodney E.; Lange, Sandra E.; Schumann, Rebecca.  
1998. In: Mattoso, Luiz H. C.; Frollini, Elisabete; Leão, Alcides, eds. *Proceedings, second international symposium on natural polymers and composites*; 1998 May 10–13; Atibaia, SP, Brazil. São Carlos, Brazil: Brazilian Institute of Research in Agriculture, Embrapa Agricultural Instrumentation: 11–20.

### **Fiberglass-Reinforced Bolted Wood Connections**

Soltis, Lawrence A.; Ross, Robert J.; Windorski, Daniel F.  
1998. *Forest Prod. J.* 48(9): 63–67.

### **► 3. Field Performance of Timber Bridges—17. Ciphers Stress-Laminated Deck Bridge**

Wacker, James P.; Kainz, James A.; Ritter, Michael A.  
1998. USDA Res. Pap. FPL–RP–572. 16 p.

This report, seventeenth in a series, documents the field performance of the Ciphers bridge located in Roseau County of Northern Minnesota. It describes the design, construction, and a 2-year field evaluation study of the Ciphers bridge. The bridge is a single-lane, stress-laminated deck bridge with a total length of approximately 12.19 m (40 ft). Built in the summer of 1989, this bridge is unique in that it is the first known bridge application to utilize red pine sawn lumber in a stress-laminated deck superstructure. An information sheet on the specific characteristics of the Ciphers bridge is given in the Appendix.

### **Wind Resistance of Light-Frame Structures**

Wolfe, Ronald W.  
1997. In: *Proceedings, third wood building/architecture technical seminar*; 1996 November 14; Seoul, Korea. Korean Wooden Architecture Association: 1–15.

### **Full Field Stress/Strain Analysis: Use of Moiré and TSA for Wood Structural Assemblies**

Wolfe, Ronald W.; Rowlands, Robert; Lin, C.H.  
1994. In: Groom, Leslie H.; Zink, Audrey G., eds. *Techniques in experimental mechanics applicable to forest products research*. Proceedings, experimental mechanics plenary session at the Forest Products Research Society annual meeting; 1994 June 29; Portland, ME. USDA Forest Serv. Gen. Tech. Rep. SO–125: 23–30.



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## Surface Chemistry

### **Bondability of Salvaged Yellow-Cedar With Phenol-Resorcinol Adhesive and Hydroxymethylated Resorcinol Coupling Agent**

Okkonen, E. Arnold; Vick, Charles B.  
1998. Forest Prod. J. 48(11/12): 81–85.

### **Strength and Durability of One-Part Polyurethane Adhesive Bonds to Wood**

Vick, Charles B.; Okkonen, E. Arnold  
1998. Forest Prod. J. 48(11/12): 71–76.

### **Reactivity of Hydroxymethylated Resorcinol Coupling Agent as it Affects Durability of Epoxy Bonds to Douglas-Fir**

Vick, Charles B.; Christiansen, Alfred W.; Okkonen, E. Arnold  
1998. Wood Fiber Sci. 30(3): 312–322.

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## Timber and Fiber Demand and Technology Assessment

► **4. Analysts Guide to FEEMA for Financial Analysis of Ecosystem Management Activities**

Fight, Roger D.; Chmelik, John T.  
1998. USDA Forest Serv. Gen. Tech. Rep. FPL–GTR–111. 5 p.

This report describes strategies for using the Financial Evaluation of Ecosystem Management Activities (FEEMA) software. This program was developed as a tool to assess the financial viability of management activities for removing small trees for manufacture into wood products.

### **Wood Products Used in New Nonresidential Building Construction, 1995**

McKeever, David B.; Adair, Craig  
1998. APA—The Engineered Wood Association. 60 p.

► **5. SouthPro—A Computer Program for Managing Uneven-Aged Loblolly Pine Stands**

Schulte, Benedict; Buongiorno, Joseph, Lin, Ching-Rong; Skog, Kenneth  
1998. USDA Forest Serv. Gen. Tech. Rep. FPL–GTR–112. 47 p.

SouthPro is a Microsoft Excel add-in program that simulates the management, growth, and yield of uneven-aged loblolly pine stands in the southern United States. This manual provides suggestions for working with Excel, describes program installation and activation of SouthPro, and gives background information on the SouthPro growth model. The manual includes a comprehensive tutorial that explains how to start the program; enter simulation data; generate BDq distributions; add, delete, and retrieve setup files; execute single and multiple simulations; plot summary statistics; and produce stock-and-cut tables and marking guides. Limitations of the model and appropriate interpretations of its predictions are discussed.

### **Carbon Cycling Through Wood Products: The Role of Wood and Paper Products in Carbon Sequestration**

Skog, Kenneth; Nicholson, Geraldine A.  
1998. Forest Prod. J. 48(7/8): 75–83.

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## Wood Chemistry

### **The Second Generation of Polyoxometalate Delignification Agents for Effluent-Free Bleaching**

Atalla, R.H. Weinstock, I.A.; Reiner, R.S.; Houtman, C. J.; Sullivan, C.; Hill, C. G.  
1998. In: Proceedings, 1998 international pulp bleaching conference; 1998 June 1–5; Helsinki Fair Centre, Helsinki, Finland. Book 2. Poster presentations.

### **A Rapid Modified Method for Compositional Carbohydrate Analysis of Lignocellulosics by High PH Anion-Exchange Chromatography With Pulsed Amperometric Detection (HPAEC/PAD)**

Davis, Mark W.  
1998. J. Wood Chem. Technol.: 18(2): 235–252.

### **Selective Transition-Metal Catalysis of Oxygen Delignification Using Water-Soluble Salts of Polyoxometalate (POM) Anions—Part I. Chemical Principles and Process Concepts**

Weinstock, Ira A.; Atalla, Rajai H.; Reiner, Richard S.; Houtman, Carl J.; Hill, Craig L.  
1998. Holzforschung. 52(3): 304–310.

### **Selective Transition-Metal Catalysis of Oxygen Delignification Using Water-Soluble Salts of Polyoxometalate (POM) Anions—Part II. Reactions of $\alpha$ -[SiVW<sub>11</sub>O<sub>40</sub>]<sup>5-</sup> with Phenolic Lignin-Model Compounds**

Weinstock, Ira A.; Hammel, Kenneth E.; Moen, Mark A.; Landucci, Lawrence L.; Ralph, Sally; Sullivan, Cindy E.; Reiner, Richard S.  
1998. Holzforschung. 52(3): 311–318.







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